

XIII.—*Contributions from the New Mexico Biological Station.*
—No. IV. *Diptera from the Sacramento and White Mountains, in Southern New Mexico.* I. By C. H. TYLER
TOWNSEND.

THE Sacramento Mountain and White Mountains are situated in south-central New Mexico, in north-eastern Doña Ana, and western Lincoln counties. The Mescalero Apache Indian Reservation is located within the limits of the northern portion of the range. White Mountain stands at the north-western end of the Sacramentos, and really forms a part of the range. It is the highest point, being in the neighbourhood of 11,000 feet. Military maps give its elevation as 11,092 feet. The Rio Ruidoso heads on its eastern slopes, as do also Eagle Creek and the two forks of the Rio Bonito. The most of the Ruidoso collecting was done some miles below its head, from just above Dowling's Mill to a point 4 miles west, the altitude being about 6500 to 6600 feet. Dowling's Mill is given by military maps as 6455 feet. Austen's Ranch, on the north fork of the Rio Bonito, is about 6400 feet; it is situated some 12 miles up this fork west from Fort Stanton (now recently abandoned as a military post), which latter is on the Rio Bonito just below the junction of the two forks, at an altitude of 6151 feet.

The Mescalero Agency, or post-office of Mescalero, being the only settlement on the reservation and the headquarters of the Indian Agent, is situated in the head of the main valley of the Rio Tularosa, on the Ruidoso road, some 7 miles below or south of the top of the divide. It is halfway between Tularosa town and the Upper Ruidoso store, it being 18 miles from the Agency to either place. The altitude of the divide just mentioned is about 7000 feet. White Mountain, it is understood, with the Rio Ruidoso and Rio Bonito, lies on the other side of this divide, to the north and north-west of it. The altitude of the Agency is 6340 feet; that of Tularosa town, situated on the plain at the western base of the mountains and near the mouth of the Rio Tularosa valley, is 4140 feet. These and several other elevations, including White Mountain and Dowling's Mill, with other valuable data, were kindly furnished me by Lieutenant V. E. Stottler, U.S.A., who has charge of the Mescalero reservation, and to whom I wish here to express my thanks for many courtesies.

The road from Tularosa to the Agency follows up the

valley of the Rio Tularosa, which is a beautiful clear stream furnishing water for irrigating the small patches of the Indians and the several small ranches situated in the valleys of the cañon. The best collecting of all was done on the flowers of the rankly growing *Bigelovia graveolens*, var. *glabrata*, in October, along this road, which usually follows the course of the stream up closely here. This collecting was done in the upper extent of the long stretch of *Bigelovia* patches, the altitude being from about 5700 to 6200 feet. An account of this is given under the head of *Dejeania rutilioides*. These patches of *Bigelovia* extend all the way down the valley, in close proximity to the stream, with hardly a break, from Blazer's Mill, which is less than a mile below the Agency, elevation about 6200 feet, to the halfway point to Tularosa, where the road crosses the stream, elevation about 5200 feet, a distance of 8 miles. The plants are often immense, with heavy woody trunks and branches, and some stand as high as 8 or 9 feet. They are in the height of bloom about the 1st of October. The October collecting on the Rio Ruidoso was done on flowers of *Senecio Douglasii*; on the Rio Bonito the October collecting was done on *Aster laevis*, which grew rankly in large patches bearing profuse bloom.

My thanks are due to Professor E. O. Wooton for the determinations of the plants. Professor Wooton writes me that his material of the *Rhus* mentioned in this paper agrees more nearly with the descriptions of *R. glabra* than with anything else; but he adds that he had no authentically named *glabra* material by him for comparison. Prof. J. D. Tinsley, independently of Professor Wooton's determinations, also sent me the names of five of the plants, and considers the *Rhus* to be *R. glabra*.

A portion of the Diptera treated in this paper was collected by Professor Wooton in June and July, 1895, while on a botanical trip on the Ruidoso and eastern slopes of White Mountain. Not only was record kept on his trip of the flowers on which the Diptera were obtained, but care was taken to secure approximately by aneroid the elevations of the principal places where collecting was done, which information is very valuable. All material aside from the above was collected by the writer in October 1895.

All elevations given with the word "about" are estimates made by the writer from points in the vicinity whose elevations are known. They have been carefully estimated, and can be taken as very nearly correct.

Stratiomyidæ.

1. *Microchrysa*, sp. ?

One female, Rio Ruidoso ; on foliage, July 3 (*Wooton*). About 6400 feet (this locality and elevation always mean that Professor Wooton omitted to give elevation and exact locality, which are taken to be just below Dowling's Mill).

Length 6 millim.

Front nearly as wide as eyes. Arista terminal. Abdomen very flattened, narrowed at base, subquadrangular, wider than thorax, rounded at each end, wholly shining green. Thorax shining green with strong purple reflection.

Syrphidæ.

2. *Pipiza occidentalis*, sp. n.

One female, Rio Ruidoso ; on flowers of *Rhus glabra*, L., July 10. Four miles west of Dowling's Mill, 6600 feet (*Wooton*).

Length 5 millim.

Differs from Williston's description of *P. pulchella* only in the following particulars:—Abdomen less than twice as long as thorax. There is no "slender deep groove" before margin of scutellum. Legs black ; tips of all femora, bases of anterior tibiæ, basal two joints of front and middle tarsi, and tips of hind metatarsi with next tarsal joint yellowish or reddish yellow. Hind metatarsi not more swollen than other tarsal joints. The apical cross-vein is subsinuate, being abruptly straight at its base, but curved on its final portion ; it forms a right angle with fourth vein. The auxiliary vein terminates hardly beyond anterior cross-vein. Closely like *pulchella* in all other points.

This species is very distinct from the two described by Williston in the Biol. Centr.-Am., Dipt. iii. pp. 6-7.

Mr. W. A. Snow identifies (Kans. Univ. Quart. iii. p. 227) three specimens of *Pipiza* from the Magdalena Mts., N. M., as *P. pistica*, Will. The present species is distinct from *pistica* in the pile of eyes being black (except, perhaps, that on upper portions next front), and the hind metatarsi not being thickened.

3. *Baccha lemur*, O. S.

One female, Rio Ruidoso, 4 miles west of Dowling's Mill, 6600 feet, July 10. On flowers of sumac, *Rhus glabra*, L. (*Wooton*).

Length 10 millim.

Face of a yellowish-grey ground-colour, facial stripe deep buff-yellow. Abdominal cross-bands reddish yellow. Legs pale yellow; tarsi brownish, hind femora and tibiæ with a pale brownish ring before tip.

4. *Volucella Anna*, Will.

One male, Rio Ruidoso, about 6400 feet, June 30. On flowers of *Philadelphus serpyllifolius* *, Gray (*Wooton*).

The third joint of antennæ is rather deeply excised on front edge.

5. *Volucella Comstocki*, Will.

One male, Rio Tularosa, below Blazer's Mill, about 6000 feet (this locality and elevation, wherever given, mean somewhere between the 5700 and 6200 feet elevations). On flowers of *Bigelovia graveolens*, var. *glabrata*, Oct. 20.

Length $9\frac{1}{2}$ millim.

6. *Volucella Victoria*, Will.

One female, Rio Tularosa, below Blazer's Mill, about 6000 feet. On flowers of *Bigelovia graveolens*, var. *glabrata*, Oct. 20.

Length 10 millim.

Antennæ are scarcely darker coloured than face and front. Scutellum, instead of being "deep pitchy black," as in Williston's description (Syn. p. 145), is wholly chestnut above, as in *V. Comstocki*. All the veins of wings are faintly bordered with yellowish. The marginal cell is closed, but not petiolate.

7. *Eristalis tricolor*, Jaenn.

One female, Rio Bonito, Austen's Ranch in the Bonito Park, about 6400 feet. On flowers of *Aster laevis*, L., Oct. 17.

This is the first record of this species being found in New Mexico, and even in the United States. I took it the same year (1895) abundantly on the lower Rio Grande at Brownsville, Texas, as will appear in a paper soon to be published on the Diptera of that region. The present specimen has the black more widened out posteriorly on abdominal segments

* Prof. J. D. Tinsley identifies this species as *Philadelphus macrophyllus*. This determination has later been verified by Mr. Frederick V. Coville, of the U.S. Department of Agriculture.—C. H. T. T.

than in Brownsville and Lower Californian specimens. It is evidently the same species, although the more prevailing black of posterior half of abdomen gives it a slightly different facies. It may, perhaps, represent a northern race of this tropical species.

Note.—Mr. W. A. Snow, in his "Supplementary List of North-American Syrphidæ" (Kans. Univ. Quart.), has followed Giglio-Tos in considering *E. tricolor*, Jaenn., a synonym of *E. pusillus*, Meq. I fail to see anything in Macquart's description that would lead me to believe in this synonymy.

8. *Chrysochlamys cræsus*, O. S.

One female, Rio Ruidoso, 4 miles west of Dowling's Mill, 6600 feet. On flowers of *Rhus glabra*, L., July 10 (*Wooton*).

Length 9 millim.

Legs wholly saturate reddish yellow, only the coxæ fuscous.

9. *Milesia bella*, sp. n.

Two specimens (male and female), Rio Ruidoso, 4 miles west of Dowling's Mill, 6600 feet. On flowers of *Rhus glabra*, L., July 10 (*Wooton*).

Length of male 15 millim., of female hardly 16 millim.

Differs from Williston's description of *M. ornata* (Syn. p. 255) as follows:—Male with triangular brown spot at base of antennæ above; female with posterior orbits more cinereous than yellow, though this character is doubtless more or less variable. The anterior two yellow fasciæ of prothoracic dorsum roughly forming a yellow transverse H-shaped marking, cleft through the middle of the bar by a rather wide black vitta; the suboval humeral spot helps to form this, but does not coalesce with it, being separated by a narrow neck of black from the rest of the half of the marking of that side, which is L-shaped on the right side and the reverse on the left. Pleuræ, without yellow on anterior border from humeri to base of anterior coxæ, black. Second abdominal segment with a yellow cross-band interrupted in middle, anterior border of each half running obliquely outward and forward, hind border sinuate; a transversely elongate yellowish spot behind these on each side on posterior corner of segment. Third and fourth segments in male with an anterior uninterrupted yellow cross-band, widened at ends; the third segment with a posterior brownish-yellow band of same width not widened at ends, this band on fourth segment being twice as broad as on third. In female the yellow (anterior)

band of third segment is narrowly interrupted. Pile of abdomen yellow on the bright yellow markings, black on the black and brownish-yellow markings. Legs yellow, the front tibiæ and tarsi of both sexes black or brownish black except extreme bases of tibiæ; the female with a tinge of brownish on uppersides of all the femora and an elongate brown spot on inside of hind tibiæ, the male with latter and with extensive dark brown shading on uppersides of all femora. Hind coxæ in both sexes with a large yellow pollinose spot on outside, and a linear transverse yellow marking above this situated below and in front of the yellow halteres. Wings nearly hyaline, faintly fuscous near tips, faintly yellowish in basal half of submarginal cell and in base of marginal cell, also somewhat along veins at base of wing.

This species is very distinct from Williston's *M. pulchra* from Guatemala.

Conopidæ.

10. *Oncomyia*, sp.

One female, Rio Ruidoso, 6600 feet. On flowers of *Erysimum asperum*, DC., July 3 (*Wooton*).

It is impossible to say what species this is, as the antennæ are entirely wanting and only a hind femur and a middle femur and tibia remain of the legs.

Length 4 millim.

It differs from Loew's description of *O. loraria* (not taking into account the antennæ or legs so far as they are wanting) as follows:—Four black vittæ on thorax, the outer ones divided by suture so as to resemble two spots, the inner ones more pollinose and less conspicuous. Abdomen soft black, narrow hind margins of first to fourth segments cinereous pollinose, the cinereous on fourth segment with a median line running from it to front border of segment; fifth segment very short, with narrower cinereous hind border; sixth segment wholly cinereous, except an oval median black space on dorsum. Second to fourth segments each with a conspicuous cinereous marking on side, that of second segment being nearly round and situated on posterior corner, that of third being elongate, nearly longitudinal, only very slightly oblique, extending from anterior to posterior border, that of fourth segment being elongate and strongly oblique, reaching from front to hind border. There is also cinereous shading on sides of first segment.

Tachinidæ.

11. *Dejeania rutilioides*, Jaenn.

Twenty-seven specimens (all females), Rio Tularosa, below Blazer's Mill, about 6000 feet. On flowers of *Bigelovia graveolens*, var. *glabrata*, Oct. 20, except two taken Oct. 13.

The fact that they are all females and were taken so late in the year is worthy of remark as bearing on the hibernating habits of this and other Tachinidæ. The nights in the mountains at this date had been cool and frosty for a week or more, the days, however, being warm; and these Tachinids, usually so active, alert, and difficult to catch even with a net, were all taken by simply sweeping with the hand alone, as were also upwards of two hundred other large Tachinids of various genera on this and other flowers. All the October collecting mentioned in this paper was done in this way. The cold nights had dulled the sense of alertness of these flies to such an extent that with care they could be approached to within a few feet before taking flight. As already stated, the *Bigelovia* above mentioned grows rankly for miles along the Tularosa creek, in many places attaining a height of 7 feet and sometimes more, and blooms profusely in October. Its flowers were everywhere covered (Oct. 20) with hundreds of large Tachinids of such genera as *Dejeania*, *Jurinia*, *Saundersia*, *Echinomyia*, &c., as may be judged from the number collected in a few hours by the hand alone.

A word may be said as to the cause of such an abundance of large Tachinids at this season in this locality. The seasons are usually moderately wet in these mountains, but the season of 1895, in October of which year this collecting was done, had been an unusually wet one for New Mexico. As testimony of this, Silver City and Socorro both sustained much damage from cloudbursts in the summer of that year. The wet season stimulated vegetable growth to an unusual degree, and lepidopterous larvæ were abnormally abundant; therefore their Tachinid parasites bred to an unusual extent. Hundreds of these Tachinids were seen that were not taken. In no case were any seen in copulation.

The genus *Dejeania* is said by van der Wulp to have the front tarsi enlarged in the female and the last tarsal joint of male surrounded with long curved bristles. All the above specimens of *rutilioides* have the front tarsi strongly widened; they also have last tarsal joint with curved bristles. Whether the latter are longer and more pronounced in the male of this species I cannot say, as I have no male specimens at hand, but this is doubtless the case.

12. *Dejeania corpulenta*, Wd.

Three males, Rio Ruidoso, 6400-6600 feet. On flowers of *Asclepias speciosa*, Torr. (6400 feet), July 8; on flowers of *Rhus glabra*, L., 4 miles west of Dowling's Mill (6600 feet), July 10; and one on foliage (about 6400 feet), July 3 (Wooton).

One male, Rio Tularosa, below Blazer's Mill, about 6000 feet. On flowers of *Bigelovia graveolens*, var. *glabrata*, Oct. 20.

13. *Dejeania hystriosa*, Will.

Thirty-five specimens, apparently all females. Twenty-nine taken on flowers of *Bigelovia graveolens*, var. *glabrata*, Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20, except two taken Oct. 13. Six taken on flowers of *Senecio Douglasii*, DC., Rio Ruidoso, above Dowling's Mill, about 500 feet, Oct. 15.

Length $10\frac{1}{2}$ - $13\frac{1}{2}$ millim.

This species has the facies of a *Saundersia*, but is distinguished at once from that genus by its well-developed palpi.

14. *Saundersia maculata*, Will.

One male, Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20. On flowers of *Bigelovia graveolens*, var. *glabrata*.

Length 13 millim.

The spot of fourth abdominal segment is white, sharply three-toothed posteriorly, and indented on each side anteriorly.

15. *Jurinia algens*, Wd.

One female, Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20. On flowers of *Bigelovia graveolens*, var. *glabrata*.

16. *Jurinia apicifera*, Walk.

Seven male and two female specimens. Five males on flowers of *Aster laevis*, L., Rio Bonito, at Austen's Ranch, about 6400 feet, Oct. 17. Two males and one female on flowers of *Senecio Douglasii*, DC., and one female on flowers of *Aster laevis*, L., Rio Ruidoso, above Dowling's Mill, about 6500 feet, Oct. 15.

The silvery cinereous sheen of anal segment is obscure in all, and hardly perceptible in some. The foot-claws of male

are not so long as in Brownsville specimens, and are often reddish or yellowish at base.

17. *Jurinia hystrix*, Fabr.

Seventeen specimens, all females. Rio Tularosa, below Blazer's Mill, about 6000 feet, one taken Oct. 13 and the others Oct. 20. On flowers of *Bigelovia graveolens*, var. *glabrata*.

Length 12-15 millim.

These come nearest to Williston's form *c* (Trans. Am. Ent. Soc. xiii. p. 299). Front tarsal joints are not dilated, palpi yellow, third antennal joint about same length as second. About six or eight strong spines in row in middle of hind border of second abdominal segment, and two at each side on hind border, but no continuous row on hind border of second segment. A continuous row of strong spines on hind border of third segment. All with two orbital bristles.

This species may be known by the yellow pile of occiput, the black or brown bases of wings, and the faintly but perceptibly clouded anterior cross-vein. The anterior portion of thoracic dorsum is yellowish dusted, the abdomen is chestnut, head and body stout, front wide, posterior half of abdomen strongly spinose.

18. *Jurinia lateralis*, Macq.

One female, Rio Ruidoso, 4 miles west of Dowling's Mill, 6600 feet. On flowers of *Rhus glabra*, L., July 10 (Wooton).

One male, Rio Tularosa, below Blazer's Mill, about 6000 feet. On flowers of *Bigelovia graveolens*, var. *glabrata*, Oct. 20.

19. *Echinomyia iterans*, Walk.

Sixty-two specimens, of which only four are males, as follows:—twenty-eight females and two males, Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20, on flowers of *Bigelovia graveolens*, var. *glabrata*; one female, same locality and flowers, Oct. 13; eight females, Rio Bonito, Austen's Ranch, about 6400 feet, Oct. 17, on flowers of *Aster laevis*, L.; twenty females and two males, Rio Ruidoso, above Dowling's Mill, about 6500 feet, Oct. 15, on flowers of *Senecio Douglasii*, DC.; and one female, same locality and flowers, Oct. 16.

Front tarsi of female are not widened in this species. Palpi are filiform, as in *E. Thomsoni*. Sides of face with two strong bristles near orbits. Antennae black. Proboscis somewhat elongate and slender. Sometimes abnormal speci-

mens occur, showing three or even four strong bristles on sides of face near orbits. One female has three on one side and four on the other, the latter making a continuous row with the descending frontal bristles; another female shows only one bristle on one side and two on the other, while still another female shows but one on each side. The third antennal joint in male is usually more widened apically, sometimes very strongly so. In one female the third antennal joint is pale reddish, with rest of antennæ black.

Also one female, White Mountain, 9500 feet, July 6 (Wootton). In this specimen the second antennal joint is more reddish than black.

20. *Echinomyia Thomsoni*, Will.

One hundred and six specimens, as follows:—Sixty-five (eleven males and fifty-four females), Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20, except five of the females taken Oct. 13, on flowers of *Bigelovia graveolens*, var. *glabrata*; twenty-one (twelve males and nine females), Rio Bonito, Austen's Ranch, about 6400 feet, Oct. 17, on flowers of *Aster levis*, L.; twenty (seven males and thirteen females), Rio Ruidoso, above Dowling's Mill, about 6500 feet, Oct. 15, on flowers of *Senecio Douglasii*, DC.

These specimens vary in length from 8 to nearly 14 millim.

The female has two rows of orbital bristles on each side of the front, beside the row of frontal bristles along the vitta, while the male normally has only one row. But males occur having some extra orbital bristles, showing an approach to the two rows of the female. The claws and pulvilli in some males are much shorter also than in others. These secondary sexual characters in the male depend largely for constancy on the size and robustness of the specimens. I believe that all the above-mentioned specimens belong to this one species, as they otherwise agree well except for size. In occasional specimens the black of abdomen is somewhat more pronounced, while in others the red shows more conspicuously; but these are merely slight colour-variations, and are, moreover, quite rare. In some specimens the front is golden, while in others it is silvery pollinose. It may also be mentioned that the front tarsi are a little widened in the female.

There is a very great difference in size between the most robust specimens and the smallest ones. All the specimens examined, selected from the two extremes in size, show no median macrochætæ on first abdominal segment, two median

on hind margin of second, a continuous row on hind margin of third, and two rows on fourth.

Also two females and one male, Rio Ruidoso, 4 miles west of Dowling's Mill, 6600 feet, July 10, on flowers of *Rhus glabra*, L. (Wooton). One of the females is considerably stouter than usual, and the male has the abdomen somewhat different in appearance; but it is due, I think, to the silvery pollen being rubbed and obscured.

21. *Echinomyia Victoria*, sp. n.

Echinomyia, sp. n. ♀, Towns. no. 60, Trans. Am. Ent. Soc. xxii. p. 72.

I propose the name *E. Victoria* for this species, as it does not seem to be named.

Nine females, Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20, on flowers of *Bigelovia graveolens*, var. *glabrata*; and a smaller female, Rio Ruidoso, above Dowling's Mill, about 6500 feet, Oct. 15, on flowers of *Senecio Douglasii*, DC.

Front tarsi wide in both sexes; palpi not slender filiform, but thickened and much shorter; sides of face without the pair of bristles near orbits; second antennal joint reddish yellow; proboscis shorter and stouter. Otherwise this species agrees with *E. iterans*, except that thorax is less brassy, and the abdomen has median line of black spots usually well pronounced, sometimes widened behind on last two segments. The species is on the average more robust. It differs chiefly from *E. dakotensis*, Towns., by the prevailing reddish-yellow colour of abdomen, *dakotensis* having much more black on abdominal segments.

Also one male, Rio Ruidoso, 8500 feet, July 6 (Wooton).

22. *Echinomyia neglecta*, sp. n.

Echinomyia, sp. aff. *Thomsoni*, Will., and *iterans*, Walk., of Towns. MS.

This species I have known for some time, and as it seems to be also without a name, I propose to call it *E. neglecta*.

Three females, Rio Tularosa, below Blazer's Mill, about 6000 feet, Oct. 20, on flowers of *Bigelovia graveolens*, var. *glabrata*. Three females, Rio Ruidoso, above Dowling's Mill, about 6500 feet, Oct. 15, on flowers of *Senecio Douglasii*, DC.

This species differs from *Thomsoni* by the antennæ being wholly deep black instead of second joint reddish yellow; in abdomen (except imperfect median stripe) being brighter red,

with the silvery sheen much less noticeable; and in the thoracic dorsum being less brassy pollinose. It is an intermediate form between *Thomsoni* and *iterans*; from *iterans* it differs in the front tarsi of female being widened, abdomen more deeply tinged with red, and dorsum of thorax less brassy pollinose. Palpi are slender, filiform, as in both *iterans* and *Thomsoni*.

Three of the above specimens have three bristles on sides of face near orbits, instead of only two.

Also one female, Rio Ruidoso, 4 miles west of Dowling's Mill, 6600 feet, July 10, on flowers of sumac, *Rhus glabra*, L. (Wooton).

23. *Echinomyia*, sp.

Two specimens (male and female) of a blackish species, with a stigma-like spot on wings. Taken by Prof. Wooton on White Mountain, 9000 feet, July 3, on flowers of *Helenium Hoopesii*, Gray.

XIV.—*The Physiological Importance of the Air-Spaces in Flying Animals.* By R. VON LENDENFELD*.

It is well known that in the bodies of the majority of insects and birds large spaces filled with air are met with which appear morphologically as local expansions, relatively as appendages of the respiratory organs. They are developed in very different ways in the different species, and are not present in all insects. In general it may be said that in animals capable of strong and sustained flight they are highly developed and spacious, that in bad fliers they attain a lower degree of development or (as in some insects) do not occur at all, and that in all non-flying insects they are entirely wanting. It is thus rendered probable that they are in some way directly or indirectly connected with the flying motion, and are to be regarded physiologically as organs subservient to flight. Further, from the very considerable size of these organs, especially in Hymenoptera and many birds, a conclusion may be drawn as to the great importance which they must possess.

With reference to these air-spaces three suppositions are possible:—(1) they are exclusively accessory respiratory

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